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AUTHOR Kalba, Konrad K.
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ABSTRACT

Cable television offers a great potential for the improvement of present health services. A multipurpose cable communications system, adapted to interorganizational medical uses, could constitute the communications infrastructure needed in the present disorganized state of health care delivery. Such a system of video and data transmission offers better medical record keeping, faster medical testing and referral, opportunities for personnel training and continuing medical education for doctors in the community, and opportunities for much improved administrative communication. Ultimately costs would be less and efficiency far greater. Disadvantages to the incremental implementation of such a system are discussed, along with the examples of the use of cable television in medicine to date. (RB)

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COMMUNICABLE MEDICINE:
CABLE TELEVISION AND HEALTH SERVICES

by

Konrad K. Kalba

September 1971

A Report Prepared for the
SLOAN COMMISSION ON CABLE COMMUNICATIONS

The opinions expressed herein are the views of the author and do not reflect necessarily the opinions of the members of the Sloan Commission on Cable Communications or of the Alfred P. Sloan Foundation.

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APPENDIX: Study Participants*

Sam A. Agnello, Director
Division of Audiovisual Education
Duke University Medical Center
Durham, North Carolina
(and Secretary, The Health Sciences Communications Association)

Reba Benschoter, Chief
Biomedical Communications Service
University of Nebraska Medical Center
Omaha, Nebraska

Stanley Briller, M.D., Director
Audiovisual Communications
University of Pennsylvania Medical School
Philadelphia, Pennsylvania

Arthur Cornfeld, Legal Counsel
Network for Continuing Medical Education
New York, New York

Victor Crown
Department of Community Medicine
University of Pennsylvania
Philadelphia, Pennsylvania

Lucile Dismukes
Nurse/Allied Health Coordinator
Georgia Regional Medical Program
Atlanta, Georgia

Richard Dumont
Director of Radio, TV and Motion Pictures
American Medical Association
Chicago, Illinois

Evelyn Flook, Associate Director
National Center for Health Services Research and Development
Department of Health, Education and Welfare
Rockville, Maryland

Richard R. Getz, Director
Medical Media Network
Los Angeles, California
(and Secretary, Association of Medical Television Broadcasters)

David Glazer, Director
Georgia Regional Medical Television Network
Atlanta, Georgia
(and Director of Communications
Emory University School of Medicine)

Peter Goulding
Director of Communications
American Dental Association
Chicago, Illinois

William Hamilton
Kaiser Foundation Audio-Visual Center
Oakland, California

Richard N. Harner, M.D., Chief
Department of Neurology
The Graduate Hospital of the University of Pennsylvania
Philadelphia, Pennsylvania
(and Treasurer, American Electroencephalographic Society)

Albert Horley, Ph.D., Director
Office of Telecommunications Policy
Department of Health, Education and Welfare
Washington, D. C.

Van Johnson
Biomedical Communications Service
University of Nebraska Medical Center
Omaha, Nebraska

Emmett Kenney, M.D.
Asst. Prof. of Psychiatry
Nebraska Psychiatric Institute
Omaha, Nebraska

Edwin Langberg, Ph.D.
Consultant, Medical Systems
General Electric Company
Philadelphia, Pennsylvania

Arthur Levin, M.D.
Health Services Administration
New York, New York

* This list represents those individuals who contributed information to this study in personal interviews or by other means of communication.

Ray A. Litke
Senior Development Engineer
Communications Office for Research
and Teaching
University of California Medical Center
San Francisco, California

Irving R. Merrill, Director
Communications Office for Research
and Teaching
University of California Medical Center
San Francisco, California

Davis McCarn, Deputy Director
Lister Hill Center for Biomedical
Communications
Department of Health, Education and Welfare
Bethesda, Maryland

Joseph P. Mingioli
Television Project Officer
National Medical Audiovisual Center
Atlanta, Georgia

James Onder, Ph.D.
Department of Communications
American University
Washington, D. C.

Thomas L. Ross, Jr., M.D., Director
East Central District
Georgia Regional Medical Program
Macon, Georgia

Rafael C. Sanchez, M.D., Director
Division of Continuing Education
Louisiana State University Medical Center
New Orleans, Louisiana
(and Chairman, Committee on Television,
Louisiana State Board of Hospitals)

Norman Siegel, Ph.D.
Chief, Communications Services
Department of Health
New York, New York
(and President, New York State
Educational Communications Association)

Lucian Stanley, Director
Louisiana Hospital Television Network
Baton Rouge, Louisiana

James H. R. Sutherland, Ph.D.
Director, Health Communications
Medical College of Georgia
Augusta, Georgia
(and Chairman, The Health Sciences
Communications Association)

Berne Wise
Medical Committee on Human Rights
Philadelphia, Pennsylvania

Cecil L. Wittson, M.D., President
University of Nebraska Medical Center
Omaha, Nebraska

I. INTRODUCTION: COMMUNICATIONS TECHNOLOGY AND HEALTH CARE

If cable television is here to stay, and will in fact develop into a widespread and sophisticated medium of communication, how will this affect the future delivery of health services? Or, more to the point, how can this new communications technology be applied to improve our health services in an optimal fashion? These are the types of general questions upon which this paper is predicated. They are questions which evoke uncharted territory and which can easily exhaust the limits of analysis. More important, they suggest a host of issues that impinge not only on the evolution of cable television, but on our overall societal capacity to utilize technology for the alleviation of pressing social concerns, to wit our failing health-care system.

The proponents of cable television have argued that we are on the verge of a communications revolution. They point to the medium's multiple-channel capacity, to its enormous potential for interactive, or two-way forms of communication, and to its compatibility with other emerging communications technologies from the portable videotape recorder to satellite relay systems. All of these properties, they contend, will coalesce into a new apparatus of video and data transmission that will restructure our social, cultural, and economic environments. Cable television, according to these projections, will radically transform the delivery of commercial and public services; it will satisfy the entertainment thirsts of specialized audiences; it will relieve our sense of isolation in the midst of a complex, mass society.

And yet, despite the blue-sky blossomings of public relations efforts, the press releases, and hasty portrayals of utopia, a substantial void continues to confront our knowledge of cable television's real potential to society.

It is this void that the present paper attempts to fill in relation to health services. The paper explores how cable television and cable communications systems can be applied in continuing medical education, in public health education, and in the actual delivery and administration of health services. It delineates both possible and preferred directions in the application of the technology to our health-delivery process. And it considers some of the regulatory and organizational precepts that may be required to implement the medium's health-related potential.

Nonetheless, the paper as a whole is premised on the notion that technology, particularly communications technology, can be instrumental in improving our health-care system. To this extent it coincides in attitude, if not in purpose, with the visionary promises portrayed by the cable proponents. And communications technology is vulnerable to what might be termed "technological eschatology," namely the implication that given the proper technology our health problems will disappear. Obviously they will not, but we may become better equipped to cope with a few of them. There are concrete reasons why we should turn to communications technology for new approaches to some of the current dilemmas of manpower utilization and service delivery in the health area.

To begin on a defensive foot, there are those who would claim that medical practice is already permeated with technology and that still our health-care system is breaking down. The difficulty with this argument is that it fails to distinguish between specialized medical treatment and the large-scale delivery of health services. For while it is true that medical "miracle" devices abound (artificial organs, laser surgery, coronary monitoring systems, prosthetic limbs; the list is endless), our general health services have remained virtually untouched by technological innovation. It is only very recently that computerized health records, telediagnosis, or automated multiphasic screening programs have been conceived as valuable inventions in

health-care delivery.

At the same time, it is precisely problems of general health-care delivery -- of preventive medicine, of routine checkups and referrals, of chronic disease, and of community and environmental health -- that challenge today's medical system most severely. As New York City's Commission on the Delivery of Personal Health Services recently stated:

> Existing facilities and institutions, in the private as well as public sector, do not meet people's needs (1) for preventive services, particularly in the crises of maternity, infancy, and childhood; (2) for the long-term care of chronic illness, particularly among the aged; and (3) for care within the community of the mental and emotional disorders that so complicate other illnesses and intensify the social pathologies of alienation, vice, and crime.[1]

The same general findings have been reflected in the products of other health commissions and study groups. What they collectively indicate is that our predominantly hospital-centered system of medical care is no longer perceived as adequate to today's broadening health needs. Overall, this system has served as an effective (though expensive) purveyor of inpatient care. It has been an efficient repository for specialized medical technology. But it has largely ignored vast areas of needed health services. And it is for this reason that many in government and in the medical professions have concluded that "nothing short of a total reconstruction" of the organization of our medical system is now required.[2]

Notice that the emphasis is on "reconstruction," not on more of the same. The idea that simply more practitioners, more research, more hospital beds, even more specialized medical technology will generate a viable health-care system is being increasingly discarded by the medical community as a time-worn panacea. Instead, what is being called for is a restructuring of existing

1. Community Health Services for New York City, Report and Staff Studies of the Commission on the Delivery of Personal Health Services (New York: Praeger, 1969) p.6.

2. Ibid., p.9.

resources so that these are utilized and distributed in closer correspondence with existing health needs. Much more emphasis is beginning to be placed on the freeing of medical practitioners from routine tasks; on the updating of their knowledge; on the sharing of medical technology and specialists; on consumer accessibility to health services; on the training of community health workers; and on the instruction of patients and the lay public in preventive health and self-treatment techniques.

In this context of resource and service reorganization, technology -- especially information and communications technology -- can play an important, even a critical role. It can and should be applied in ways that will benefit not only the acute patient or specialized practitioner but the health delivery process in general. For example, a joint Harvard-MIT Task Group on Medical Care Microsystems recently reported that, "over 25 per cent of a hospital's budget is spent on information processing. Furthermore, a significant and costly portion of the time of the physician, nurse, and technical staff, is taken up by bookkeeping activities."[3] Clearly, this is one area where improved information storage and communications technology can help to reduce the non-treatment responsibilities of medical professionals.[4] Technology alone will not be enough. In certain instances group practice or the regionalization of medical services will have to be institutionalized before remote-access information systems become practical or desirable. But the capacity of such systems to release medical resources for primary practice should not be underemphasized.

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3. "Task Group Report on Medical Care Microsystems," G.Octo Barnett, Chairman, in David D. Rutstein and Murray Eden, Engineering and Living Systems: Interfaces and Opportunities (Cambridge, Mass: The MIT Press, 1970) p. 139. A supporting study referred to by the Task Group is R.A. Jydstrup and M.J. Gross, "Cost of Information Handling in Hospitals," Health Service Research, No.1 (Winter 1966), pp. 235-71.

4. Management information systems have already been introduced into hospital operations, but chiefly in the private sector and only in certain functional areas, such as billing, procurement, and personnel.

Another important area where communications technology can contribute to our health needs is in continuing health education, for both professionals and the clients of the medical system. Television's role here is likely to be particularly vital, since much of medical information has a visual dimension. Techniques of self-treatment, of diagnosis, or of psychiatric interviewing cannot be easily transmitted by print. In addition, television can overcome problems of literacy. These, paradoxically, beset not only the educationally disadvantaged but, in a different way, also the physician, who must wade through dozens of research periodicals to keep up to date with changing medical practices; practices which could often be better demonstrated on short film clips. Finally, new communications technology could be instrumental in relieving many of the delays in medical testing and referral that cripple today's health delivery process. It is this cumulation of minor annoyances (e.g. a two-hour wait for service, a faulty referral, a lost health record) or, on the other hand, physical inaccessibility to health services, that is at the heart of the medical system's inability to cope with our currently recognized health needs. Automated screening programs and teleconsultation systems are nascent steps toward the alleviation of some of these problems, but their utilization is not as yet widespread. Nor has the range of communications technology that could be applied to overcoming problems of access, referral, and routine checkups been fully explored.

Hopefully, the foregoing comments have served to sketch the case that communications technology can be a valuable ingredient of an improved health-care delivery process. The following sections of this paper will focus on the specific potential that cable television brings to this proces. However, in reading these subsequent sections, two organizational concepts should be kept in mind. The first of these is that communications technology, including cable television, is most likely to be integrated into our medical system in a piecemeal and disjointed fashion. This has been the pattern of medical

utilization of technology in the past, and, unless expressly modified, will probably continue to be in the future. The other concept is that of comprehensive health communications planning. It is a concept with little tangible identity, one which hospitals and medical agencies are only beginning to consider. But particularly when taken in conjunction with emerging concepts of how our health-care system should be restructured, it merits closer examination.

There are, to be sure, some distinct advantages to an incremental pattern of technological adoption. Discrete functional needs, for instance, are ideally satisfied by a variety--from a technical standpoint--of communications systems. "In analysing information processing needs," the Harvard-MIT Task Group has stated, "the most productive tactic appears to be the development of modules for specific information processing activities, allowing precise identification of objectives and requirements."[5] In optimal (technical) terms, the same point could apply to a communications technology like television, where separate systems would be designed for separate functions (e.g. x-ray transmission, data display, and telediagnosis. Moreover, the incremental approach is much more adaptive to conventional budgetary schedules as well as to user acceptance of new technology. How does an administrator fund a master overhaul of communications activities, and how does he convince his employees that it is necessary?

But there are also significant disadvantages to the incremental approach. In many instances, different uses of a given technology can coexist on the same system, leading to long-term cost savings and to the development of still more flexible, multi-purpose systems. In relation to cable technology specifically, a piecemeal strategy could fail to capitalize on the technology's full potential. For example, only those uses of the medium which are immediately discernable and easiest to implement (e.g. one-way and home-oriented uses) might be tested, leaving the technology's "hidden" capacities by the wayside.

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5. Rutstein and Eden, op.cit., p. 140.

By contrast, given a framework of comprehensive health communications planning, the impact of cable technology on the health-care process could be very different and potentially much broader. It could be much broader particularly if, and as, several new directions in the delivery of health-care, which are evident in an embryonic form today, are pursued and integrated in the future. Among these are: (1) the development of neighborhood based modes of health-care delivery, with emphasis on the preventive and rehabilitative aspects of medicine; (2) the creation of new medical roles for the paraprofessional and other allied health personnel; (3) the affiliation of teaching hospitals, medical schools, and public health departments with community hospitals, clinics and nursing homes; and (4) the institutional coordination of health services on a municipal or regional level.

These trends have arisen for a number of reasons, including consumer and governmental pressures as well as the medical community's own realization that health services must be rationalized if growing and previously unmet health needs are to be satisfied. If pursued, their outcome will be a multi-layered and physically dispersed system of health-care delivery, the support of which is likely to require a communications infrastructure of unprecedented scope and complexity. The hospital of tomorrow will not be a building but a configuration of services. And in the words of Willoughby Lathem of the Rockefeller Foundation, its "various levels of services will be linked through effective transportation and communication networks, which will have to be devised; and an efficient referral system will be established."[6]

It is conceivable that a multi-purpose cable communications system, adapted to interorganizational medical uses, could constitute this communications infrastructure for the future coordination and delivery of health services.

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6. Willoughby Lathem, "Technology and Health," Social Policy, Vol. I, No. 5 (January/February 1971), p.59.

Such a system of video and data transmission, including two-way interconnection between health organizations, could be utilized for administrative communications, personnel training, telediagnosis, the retrieval of patient records and lab data, the scheduling of facilities, and for other purposes. In comparison to the limited communications modes at the disposal of today's health administrator, medical practitioner, or community nurse, it could represent a quantum breakthrough.

However, for this vision of technological achievement to be realized, a comprehensive planning posture toward the introduction of new communications systems in health-care delivery will have to be adopted. And cable technology will have to be carefully assessed, along with alternative communications systems, against numerous criteria, including technical feasibility, user acceptability, and economic viability.

This paper is not intended to provide a careful cost/benefit determination of this sort. Its conclusions, based as much on leaps of the imagination as on reasoned calculation, must remain qualified. But, within these limits, it attempts to outline possible health-related uses to which cable television can be applied in the future. Some of these (sections II and III) will be more compatible with an incremental vision of cable television's utility to health services; the others (section IV) with a more far-reaching one. In either event, the promise of cable technology for health services raises a myriad of planning and regulatory issues. These will be considered in the final section of this report.

Finally, while this paper represents only a first step in evaluating the potential of a new technology to the age-old concern of health, its preparation has not been an exclusive toil. Numerous individuals, knowledgeable

in medical communication, or with overall responsibilities related to the delivery of health services, were contacted in the course of its completion. Their assistance has been invaluable.[7] And it is largely they who should be held responsible for the unexamined assumptions that have been weeded out of this paper before it was written; but not for those that remain.

7.. A list of these individuals appears at the end of this report. In addition, several non-medical individuals have, in one way or another, contributed to the preparation of this report. I would like to thank particularly Frank White and Jeff Stamps of Foundation 70, David Othmer of the Vera Institute of Justice, Jim Masters of New York City's Bureau of the Budget, Stan Garlick of the staff of the National Academy of Engineering's Committee on Telecommunications, and SCCC consultants Barbara Harrison, Seymour Mandelbaum, and Robert E. O'Brien.

II. APPLICATIONS IN CONTINUING EDUCATION, TRAINING, AND RESEARCH

Cable television is an evolving technology, but to date it has served principally as a medium for the transmission of video programming to the home. And it has been a many-to-one, rather than a switched medium. These are elemental but significant facts, in that they define the current operating parameters of the technology. By doing so, they also suggest which uses of cable television are most likely to be implemented in the immediate future. Those that do not fall within the parameters stand less of a chance of being realized than those which do.

In relation to health services, several types of uses are conceivable which would not require a substantial modification of the present technology. Among these are continuing medical education, the training of health personnel, aspects of medical research, and public health education. Each of these health-related functions could be improved through simply the programming and data access to homes and/or offices that cable television provides today or will soon provide.

Take, for instance, the training and instructional needs of a municipal department of public health. Currently, these are largely met either through centralized classes involving considerable staff, facilities and transportation, or through minimal on-the-job assistance and supervision. With the aid of cable television, a more systematic and continuous training effort could be undertaken. Instructional programming could be piped directly to ward attendants at a general hospital, to trainees at an environmental inspection station, or to community workers at neighborhood health centers. And it might cost less.

Admittedly we cannot be certain how effective such televised instruction will be. Programming of this sort is currently nonexistent, and the face-to-

face interaction that occurs in conventional training may not be easily duplicated over the new technology. Nevertheless, closed-circuit television has been utilized successfully for training purposes by business, the military, and in certain municipal departments (e.g. police and fire); and it has found widespread acceptance in medical and nursing education. As improved models of televised instruction are developed, including telephone or radio feedback systems, the impact of cable television on the training programs of health agencies and hospitals could be extensive.

Should today's cable television systems prove to be effective means of disseminating not only video-programming but data as well, their future value to the medical researcher may also be substantial. While visions of individual researchers being able to consult with each other over the cable system, or to retrieve research data on an individual basis, are premature, certain group-based research applications may become feasible in the foreseeable term. For example, the titles of new research articles, grouped by specialties, could be periodically transmitted directly to the homes or offices of medical researchers; as could be selective articles and reports in their entirety. And, with the advent of data feedback (i.e. signal-return) systems, medical agencies could poll cable subscribers in order to update health statistics or, in emergencies, to trace epidemic flows.

But the most substantial contribution of cable television to professional medical activities is likely to be in the area of continuing medical education. Over the past ten years continuing medical education has become a growing enterprise in the United States. More significantly, it is an enterprise that has increasingly turned toward audiovisual media as a primary mode of information dissemination. This gradual transition from print and verbal forms of communication to audiovisual ones has occurred for a number of reasons.

First, much of medical information (e.g. diagnostic and therapeutic techniques) is simply difficult to transfer except by person-to-person or through a dynamic visual medium. Second, in relation to verbal instruction and/or live demonstrations, the audiovisual message, whether on film or videotape, overcomes the limitations of repetitive, space-bound exposition. A speaker no longer needs to repeat his message to audience after audience, nor is his audience limited to a single locality. Third, it has been assumed that for certain classes of practitioners, an audiovisual format could synthesize and condense the volumes of printed medical information that are available, thereby reducing the burden of information retrieval.

Finally, it has been hoped that audiovisual programming would stimulate the learning instincts of the isolated private practitioner more effectively than a lecture or a technical article in a periodical.

Not all of these hopes and expectations, however, have been realized. Program production has been beset with a complex of difficulties, and existing distribution systems have not always proven adequate. Most important, the unaffiliated solo practitioner has not been reached. And yet, it is precisely this private physician who finds it most costly and time-consuming to attend medical seminars and conferences. It is he who is most likely to be isolated from routine peer interaction, which is so vital to medical self-evaluation and development. And, ultimately, it is he and his patients who are the main victims of today's knowledge explosion in medical practice and research. Consequently, if our existing medical resources are to be upgraded, new solutions to the problem of delivering continuing medical education to solo practitioners (who continue to constitute a majority of the profession) will have to be found.

Cable television may provide such a solution. It is multi-channeled and can transmit updating medical programs directly to the physician's home or office. But it is important to keep in mind that cable television is only a distribution system. In assessing its potential in continuing medical education, it would be unrealistic to separate the qualities of the medium from the organizational and programming realities of the past. What follows is a brief review of some of these past efforts, particularly in the utilization of over-the-air and closed-circuit television. It is only in the context of this existing experience that we can begin to evaluate cable television's promise for the future.

To reiterate, the continuing education field in medicine has become a manifold activity, including a variety of players, both public and private, and many who stand somewhere in between. A major example of public, or governmental, activity is the National Medical Audiovisual Center, a member agency of the U.S. Public Health Service. NMAC's mission over the past five years has been to provide, on a loan basis, a wide variety of medical films, videotapes, slide sets, and other audiovisual materials to health institutions around the country. Serving as a national clearinghouse, it disseminates the programming of government agencies, medical associations, and private film companies, as well as its own productions. In the private sector, the Network for Continuing Medical Education has fulfilled a similar role. Sponsored by a pharmaceutical company, Roche Laboratories, it distributes a biweekly video journal of three new films to some 600 hospitals and medical schools and makes past films available for replay. Other organizations, such as the larger medical associations, also distribute their own audiovisual programming.

However, while a substantial proportion of hospital-affiliated physicians are reached through the programs distributed by these national sources, others--the solo practitioners and those at non-subscribing hospitals--have remained isolated from these audiovisual forms of continuing medical education. This

fact has lead to the testing of more local patterns of outreach utilizing over-the-air television. For example, at the state level, California's Medical Television Network transmitted medical programming through local educational television stations to about 70 hospitals for a period of three or four years, but the administrative, cost and scheduling burdens of this system proved to be too great. ETV off-hours had to be used (e.g. noon break or 7:30 in the morning); programs were screened only once; each hospital had to rent a descrambling device (at $750 per year); air-time (about 60 hours) cost more than $20,000 annually; and an expensive receiver maintenance contract had to be secured. As a result, the Medical Television Network is now the Medical Media Network, and is more satisfied with a mail distribution system, by which it continues to provide both California and out-of-state institutions with its 16mm films, super-8 cartridges, and accompanying study guides.[8]

Over-the-air transmissions on ETV and commercial television have been tried elsewhere. In some cases the medical programming has gone directly into the home.[9] But even when moderately successful, these experiments have illustrated the limitations of utilizing conventional television for continuing education purposes. Limited access and off-hour time slots are simply not enough to attract large numbers of professional viewers with any degree of persistence. Nor is it enough to support the scale of facilities required for the production of quality programming.

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8. This information was acquired by phone from Mr. Richard Getz, Executive Director of the Medical Media Network.

9. For experiences at the Universities of Utah and Pittsburgh and other centers, see Jerome J. Harris, "Television as an Educational Medium in Medicine," The Journal of Medical Education, Vol. 41, No. 1, January 1966, pp. 13-15. A follow-up viewer survey four years after the inception of over-the-air broadcasts in New York City (over municipal Channel 31) was reported by Alma C. McGuinness et. al., "The Medical Television Audience of the New York Academy of Medicine After Four Years," Bulletin of the New York Academy of Medicine, Vol. 44, No. 3, March, 1968, pp. 332-45.

There has been another approach to the delivery of continuing education by television, which has not depended on over-the-air channels. Perhaps the single, most comprehensive example of this type is the Louisiana Hospital Television Network. Inaugurated in 1967 and state-funded, LHTN now encompasses 17 receiving affiliates across Louisiana, including several state hospitals, psychiatric institutions, and two medical schools. Five of these affiliates can originate programming and two, Louisiana State University Medical School at New Orleans and the Earl K. Long Memorial Hospital in Baton Rouge, are interconnected for simultaneous two-way video transmission. The primary purpose of the Louisiana system is to produce "programs dealing with updated education for physicians, nurses, mental health, mental retardation, and ancillary personnel which make up the State Department of Hospitals."[10]

Interconnection for the Louisiana network is provided by South Central Bell microwave and cable lines at a special educational rate of about $200,000 per year. This is a substantial outlay, but LHTN programs nine hours a day and the microwave circuits it utilizes are expandable to six channels at only incremental costs.[11] Programming for the system includes replays of tapes from the U. S. Public Health Service, NCME, and other sources, as well as those produced by its participating medical schools. In addition, one or two hours of live programming are presented each day, ranging from a regular electrocardiographic seminar to a teaching conference on diabetes (which patients are encouraged to attend along with their physicians). And a supplementary two-way talk-back system is available for the live programming.

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10. Louisiana Hospital Television Network, informational brochure, State of Louisiana.

11. The technical and cost specifications of the LHTN system were provided over the phone by Mr. Lucian Stanley, Director of LHTN. Additional information on programming comes from materials sent by Dr. Rafael Sanchez, Chairman of the Subcommittee on Television, Louisiana State Hospital Board.

A similar system to LHTN, but at the metropolitan level, exists in Georgia. Originally called the Community Medical Television System, and since re-named the Georgia Regional Medical Television Network, it operates within a 20-mile radius of Grady Memorial Hospital in Atlanta on a two-channel, FCC-chartered Instructional Television Fixed Service (ITFS) system. Since its inception, 24 hospitals and other medical institutions (including Emory University Medical School, the Georgia Department of Public Health, and the National Medical Audiovisual Center) have joined the network by acquiring their own receiving equipment at an average expense of $3,000. Some 20 hours of predominantly live programming (i.e. medical demonstrations, lectures, grand rounds, etc.) are presented over the GRMTN each week. This is accomplished within an annual operating budget of $185,000, which is funded by the federally-sponsored Regional Medical Program.[12]

These systems in Louisiana and Atlanta are obviously approaching the point of institutional viability in terms of their utility to users. The ITFS mode of transmission in particular is a highly efficient way of reaching hospital-affiliated physicians throughout a metropolitan area. The costs of such a system are relatively small (i.e. in comparison to leased lines) and its coverage substantial. But the existence of both of the systems is predicated on governmental subsidy and both are subject to the deficiencies inherent in available medical programming.

While the number of sources of medical programming continues to grow, none of these, whether national or hospital-based, public or profit-making,

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12. Other medical ITFS networks are in operation in San Francisco, Indianapolis, Milwaukee, Detroit, Houston, etc.

has escaped one or another form of criticism from users and local distributors. Some of the existing programming is simply too esoteric for the general practitioner with practical everyday concerns; much of it, like much of instructional TV, is flat-out boring. In other instances, the criticism is directed at the generality of the films and videotapes being produced. Programs are produced for a general medical audience, whose needs are actually heterogeneous. What is detailed for the nurse may be superficial to the specialist, and so forth. What is consequently required is a concept of program production that is audience-oriented. Mr. David Glazer, Director of the Georgia Regional Medical Television Network, has illustrated how such a concept might operate, as follows:

> "Take something like a surgical operation. What the practicing surgeon needs is detail on the actual operating techniques. For the nurses you have to place much more emphasis on pre- and post-operative examinations and care of the patient. The G.P., on the other hand, also needs different questions answered; if and when to refer a patient to a surgeon and how to deal with him after the operation. You need at least two, and probably three, different tapes of the same operation, depending on the audience. In another area, cardiac rehabilitation, we plan to do a separate tape for the nurses, a separate 13 one for the dietitians, and a third for the physician."

An equally insurmountable problem has been that of knowing when and where to reach the practicing physician, even given the best of programming. Indeed, one quickly gets the sense that a dialectic of virtually ideological proportions goes on among professionals in medical television on just this point. Some assert, catch the physician at the office during the day; once home, he's dead to the world like the rest of us. Others would stake their careers on the home-viewing evening hours. The only area of agreement is

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13. Personal interview response, March 3, 1971.

that new ways must be found to reach the practitioner where he lives or works. Few argue that the central station concept, which has been adopted both by the national programming distribution sources and, to a more limited extent, by local(e.g. ITFS) systems, is very adequate. Mainly, it is not responsive to the costs (lost fees and overhead) that face the solo practitioner who must fight city traffic and give up valuable time to watch programming of only potential import to his continuing medical education.

It is in this context of access and scheduling, that the potential of cable television assumes undeniable magnitude. The home-office dichotomy is irrelevant to its adoption. Cable television can reach the isolated medical practitioner at either place, or at both, with updating educational materials. At the same time, cable television will not automatically eliminate the programming problems that have beset medical television in the past (although it can be argued that the availability of an efficient home distribution system may motivate medical institutions to come to terms with some of these problems more readily than would otherwise be the case). But at a minimum, cable television can provide a valuable additional link between the medical programmer and his traditionally scattered constituency.

The provision of such a link, utilizing cable television, has already been attempted by two of the organizations mentioned above. In 1969, Community Medical Cablecasting, a parallel organization to the Network for Continuing Medical Education, began transmitting medical programming to physicians in five eastern-seaboard communities from Decatur, Alabama to Ithaca, New York. Today, two years later, more than 700 doctors are receiving NCME's biweekly medical journal on local cable systems (including Sterling-Manhattan's). Each new video-journal runs for about an hour and

includes three separate programming segments as well as four or five minutes of pharmaceutical ads. No extra charge for the NCME programs is involved for physicians subscribing to the participating cable systems. The tapes focus on a variety of topics, ranging from "Epidemic Genetic Disease" to "The Doctor as Investor," and are replayed a total of eight times during the two week period in evening hours. And, in the course of introducing this service, CMC is testing both private (mid-band) and open channel modes of transmission, to determine corresponding reactions of physicians and the non-medical public. In short, what we have here is an early initiative in cable medicine.

In Lake Charles, Louisiana, the Louisiana Hospital Television Network is also broadcasting directly into physicians' homes and offices through a local cable system. Since LHTN broadcasts from 8 a.m. to 5 p.m. each weekday, the cable hookup is particularly helpful to those doctors who, for one reason or another, are unable to view the LHTN programming regularly at Lake Charles Charity Hospital, the area's only institutional receiving station. The telecasts are received on a private (mid-band) channel, but in this case payment for the adapter (about $40) is the individual doctor's responsibility.

Like CMC, the Louisiana network has started negotiating with other cable system operators in order to enlarge its access to the isolated practitioner. This has been done at least in part on the prompting of a recent survey committee, which reviewed the overall status of the Louisiana Hospital Television Network. A wider role for cable television was specifically envisaged in one of the committee's principal recommendations. It stated that:

> " A drive should be mounted to promote and provide accessibility of programs to private physicians and hospitals in the State. It was our impression that not only have relatively few Louisiana physicians ever seen the programs, but many have virtually no

> knowledge of existence of the Network. Cable television systems such as the one at Lake Charles represent an expanding and inexpensive avenue for achieving this goal."[14]

Other public medical television systems are also seeking to extend their services by cable television. The ITFS system in Atlanta, for instance, has started exploring this possibility with Cox Communications, the holder of a local franchise. In the private sector, the projected Gridtronics service of Television Communications, Inc. (a multiple-system owner) will provide a special professional channel, carrying medical programming, when fully-implemented in a year or two. Other commercial systems, such as the prospective one in Columbus, Ohio, are also planning to offer health programming for general and professional viewers on a subscription basis.

But despite these few promising initiatives, current or planned, the problems of providing continuing medical education over cable television on a large scale should not be lightly dismissed. As we have seen, most of these problems are not hardware-related, but concern the administration and production/programming. In sum, cable television offers great promise toward alleviating many of the distribution and scheduling problems that have limited continuing education efforts in the past, but its effective utilization will remain subject to the resolution of perplexing program production difficulties. In addition, its full power will depend on advances in the networking of cable systems on a regional or national basis; unless such networking occurs, whether by microwave or satellite, program producing organizations will find it cumbersome to deal with a potpourri of scattered local systems except, as at present, on a highly-selective, demonstration basis.

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14. "Report of the Survey Committee for the Louisiana Hospital Television Network," Dale Groom, M.D., Chairman: May, 1970, p. 6.

Finally, cable television's utility to the process of continuing medical education will be subject to the constraints of competing media developments. Video cassettes and super-8 cartridge projectors, in particular, may supplant some of the potential that cable television offers. Yet, to some extent, the emerging array of media alternatives may produce complementary rather than exclusionary uses. Thus, a logical system of future media apportionment might consist of the more specialized programming needs being met by cassettes and the more general by cable. It is unlikely, for example, that cable television will be the ideal programming delivery system for the neurologist or bone specialist, but it may adequately serve the educational needs of most internists, general practitioners, nurses and surgeons. Only with the advent of home videotape recorders, capable of duplicating programs for individualized viewing, could cable television become the nexus of a medical library without walls. In the meantime, it can extend many medical classrooms, which is service enough.

III. APPLICATIONS IN PUBLIC HEALTH EDUCATION AND INFORMATION

An additional area where cable television (as the medium is presently constituted) could have a considerable impact is public health education. This is an aspect of health care that has largely been ignored in the past. And yet, it is increasingly recognized that serving the informational needs of the public is a critical ingredient of health-care delivery. To the extent that individuals are well informed about organized medical services, and to the extent that they are able to cope with health-related problems on their own (e.g. in nutrition, child care, chronic disability, family planning, etc.), the entire health-care system is strengthened. The importance of cable television's potential contribution to public health education lies in the fact that it provides a relatively inexpensive video mode of information dissemination into the home. It is the lack of such a mode, that has been at least one of the principal constraints in public health education efforts to date.

In examining how cable television could be applied to public health education, both of the above points--the need for better health education services and current difficulties in meeting these needs--bear underscoring. Clearly, in a more distant past, health education was not even perceived as a separate component of medicine. Rather, it was part and parcel of the process of medical treatment. The country doctor performed both functions, as did, in a sense, the travelling tonic peddler or the home-doctoring almanac. At some point, however, a breakdown in these routine educational practices began to occur; one which today is greatly amplified by the information explosion in the health sciences and the complexity of medical and educational organization. As a consequence, the burden on today's consumer in keeping up to date with disease symptoms, the aftereffects of drugs, preventive diets, and medical prepayment plans, is enormous. And the corresponding task of keeping the public informed on health-related

matters has reached an unprecedented stage of diffuseness and uncertainty. "Education for health," wrote the National Commission on Community Health Services, "has become everybody's business and no one's clear responsibility."[15]

To be more specific, there are at least three factors which undermine our current ability to educate the public in relation to its health needs: (1) the existing allocation of medical resources, (2) faulty approaches to public health education, and (3) inadequate modes of distributing health information economically to a heterogeneous public. It is the third of these points that will be discussed in greatest detail in this paper, since it relates most closely to the potential role of cable television in public health education. But the context of this role will also be determined by the first two factors, and therefore these will also be reviewed, if only summarily.

The existing allocation of medical resources has constrained the development of an adequate public health education capability simply by supporting a fee-for-service medical system. Because of this system, the physician tends to concentrate on the delivery of immediate treatment rather than on preventive and rehabilitative practices. In turn, this has placed the burden of public health activities on municipal health departments, which have been underfinanced and which, consequently, have not been able to fill health education needs, particularly those of the poor and the elderly. Coincidentally, while medical insurance plans, both private

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15. Health Is a Community Affair, Report of the National Commission on Community Health Services (Cambridge, Mass.: Harvard University Press, 1967), p. 63.

and governmental, have extended access to medical treatment, they too have not fostered (with a few exceptions, e.g. Kaiser-Permanente) significant educational and preventive programs. Finally, in the area of medical research, very few resources have been expanded on the communication of research findings to non-professionals.

In short, one answer to improving public awareness of health-related information is to reconstitute our priorities in medical resource allocation. Another is to improve our educational methods. To quote a secondary reference, there are at least four universal " 'fallacies' that tend to decrease the effectiveness of public health programs." These are summarized as follows:

> "First is the 'fallacy of the empty vessel' - the tendency to act as if no health measures or popular health culture existed and to fail to build a new approach on the positive features of what already exists. Second is the 'fallacy of the separate capsule' - the tendency to set the boundaries of health action in terms of one's own beliefs and practices. Third is the 'fallacy of the single pyramid' - the tendency to assume homogeneity of groups, especially within the artificially created boundaries of one's administrative organization. Fourth is the 'fallacy of the interchangeable faces' - the tendency to ignore individual differences and person-to-person relationships."[16]

Each of these fallacies has projected campaign after campaign in public health education to failure, especially in poverty and blue-collar areas. What they indicate are the shortcoming of simply "diffusing" information, which the health educator considers valuable, to an indigent population. Rather, what is required is a comprehensive communications process between the health service delivery system and the population to be served. This

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16. Edward A. Suchman, "Public Health," in Paul F. Lazarsfeld et al., eds., The Uses of Sociology (New York: Basic Books, 1967), p. 579. Suchman is borrowing from Steven Polgar's "Health Action in Cross-Cultured Perspectives," in Howard Freeman et al., eds., Handbook of Medical Sociology (Englewood Cliffs, N.J.: Prentice-Hall, 1963).

process must be two-way in nature and must invoke not only new information but also an understanding of indigenous social and health practices, as well as improved services.

The third factor which has limited health education efforts in the past, and one on which we want to focus particular attention, pertains to the modes of information distribution that have been available to the health educator, and which are inadequate. Take, for a moment, the example of a public health nurse who conducts several group seminars a week on venereal disease. While her service may be invaluable, it is not likely to have a visible impact on a population of, say, 100,000. The personal approach is classic, but it is out of tune with today's service needs. On the other hand, existing approaches aimed at wider audiences (e.g. lectures, pamphlets, films, etc.) have also proven to be deficient. These approaches are either too costly and too general in information value, or they place the burden of information acquisition on the individual. The result is that those who need the information most are also likely to be the most removed from it.

In the area of television, health educators have utilized over-the-air broadcasting primarily where and when the good will of individual station operators has permitted them to do so. Most stations air a certain amount of free public service announcements, many of which are health-related. And some have cooperated in local health campaigns (e.g. related to polio or Rubella vaccinations), but in each instance the health educator remains at the public-relations mercy of the station and must accept sporadic and off-hours time slots for his "spot" messages. In sum, his flexibility in utilizing television is highly constrained by the cost exigencies of this competitive mass medium.

Nor is it entirely clear how effective a short announcement can be in communicating health knowledge to the public. To be sure, certain basic health facts have been imparted in this manner. Jacob Feldman illustrates this point in The Dissemination of Health Information, where he reports that, "Surveys conducted for the American Cancer Society show an increase over the years in the percentage responding either 'yes' or 'sometimes' to the question, 'Could a person have cancer without knowing anything was wrong?'"[17] But as Feldman also points out, because mass TV campaigns have been selective in terms of the diseases they cover (e.g. polio, cancer, VD), there remain prevalent illnesses about which the public is virtually uninformed (e.g. diabetes, ulcers, hepatitis).[18] And even in respect to those diseases which do receive spot coverage, the pragmatic question of the value of knowing the symptoms of a particular disease has not been resolved. Is information of this sort pertinent or is it so general that it becomes useless to any process of self-screening? To know that "a soreness in the chest" is a potentially serious sign of cancer will probably not motivate an individual to see a doctor unless he has more information about the type of chest pain which cancer involves, its duration, spread, etc. And yet it takes time to impart this information; time which is extremely costly over existing television.[19]

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17. Jacob J. Feldman, The Dissemination of Health Information: (Chicago: Aldine, 1966), p. 57.

18. Ibid., pp. 91 et al.

19. Occasionally the costs of a half-hour health education program are met, but principally on educational television and principally for the professional viewer. For example, the author's casual survey of one week's programming in the 12-channel New York metropolitan area produced four hours (out of a possible 1,000 plus hours) of such health-related programming.

Given this economic limitation to the utilization of conventional television, and the access limitations of the other media, what are the ways in which cable television might be instrumental in improving the public health education process? To answer this question in content terms, let us begin by assuming a multichannel cable transmission capability to a substantial number of homes, and that one of these channels is allocated to public health education. And let us allocate $200,000 as an annual operating budget to each urban community with access to such a channel (or roughly the amount it takes to program one hour of prime time network television). These may be slightly unrealistic premises in that, even on 60- or 80-channel systems, public health education programming may have to be time-shared on a channel with other uses. And it may cost somewhat more to program a community channel than is suggested here. Nevertheless, taken together, these two premises allow us to imagine a new kind of televised health service, which is only marginally reflected in existing applications of the TV medium.

What follows, at this point, are only hypothetical suggestions on how the channel time might be utilized. Undoubtedly, other specific uses could be imagined, and many of the uses suggested here are likely to prove impractical, or of secondary importance, once the real-life effort to provide a health education service on cable television is attempted. But the examples presented will serve as an initial range of programming possibilities, which can be tested.

For purposes of abstraction, let us label one area of potential health programming <u>health care assistance</u>. It would incorporate most of the

programming dealing with how individuals can help themselves in situations of illness. Some of this programming would be of general interest, such as a series on drugs, including poisoning control, the acquisition of curative drugs, and narcotics addiction. Other portions might be geared to a particular group, for example, the elderly and chronically ill, advising them on self-care techniques, or, the pregnant woman, explaining pre- and post-natal care and early child development. The format of the programs could vary depending on the intended audience and the proclivities of the local producers, but both dramatic and expository approaches could be tried. A call-in format, stimulating questions and answers, could be an ideal way of conveying a miscellany of information on common household diseases, accidents, and general health problems on a regular basis.

Under preventive health programming, another possible programming category, basic practices in preventive health would be explained and demonstrated. For example, a series on the preparation of low-budget yet protein- and vitamin-conscious meals could be of tremendous value to the ghetto mother. A parallel effort in which a series of programs on preventive dental health would be transmitted over closed-circuit television (with reception points in local schools, churches and housing projects), has already been proposed by a health services center in the Watts community of Los Angeles.[20] With access to a cable television system such programming could be produced not only in dental health and nutrition, but in numerous other areas of preventive health (e.g. hygiene, family planning, sanitation, mental health, etc.).

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20. "A Proposal for Dental Health Education in Watts," preliminary draft, submitted by the Dental Division of the South Central Multipurpose Health Services Center to the Office of Health Care, Office of Economic Opportunities, August 28, 1970.

And again, a variety of program formats could be explored, including film clips, local interviews, panel sessions, and brief demonstrations by public health nurses.

The purpose of a third category of programming, medical practice orientation, would be to familiarize viewers with the intricacies of medical organization. As Michael Crichton remarks in Five Patients, "A person visiting Europe can get better advance information than a person entering the 'foreign country' of the hospital."[21] More importantly, this lack of knowledge about the organization of medical services is often a deterrent to the procurement of the services. In short, programming dealing with different medical approaches to patient treatment, with hospital organization, with health-care financing and insurance, and with patient rights in medical practice, is as essential to any comprehensive health education effort as is the enumeration of symptoms or the principles of first aid.

A fourth category of programming, community health information, is one in which cable television's role could be particularly unique. Here an attempt could be made to provide current information about local health services on as continuous a basis as possible. Different program segments might be devoted to different geographical sub-sections of the community, stating the times and places at which various kinds of health services are available along with any special health-related campaigns that are underway. This same programming might also become an excellent vehicle for acquainting viewers with local doctors and public health personnel, thereby relieving the psychological distance which often obstructs the meeting of health needs.

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21. Michael Crichton, Five Patients: The Hospital Explained (New York: Alfred A. Knopf, 1970), p. 207.

Finally, a health news program, covering community medical facilities and events, and possibly also relevant research or legislative developments, could be presented to the entire viewing population on a weekly or monthly basis.

While the above types of programming focus on different aspects of the delivery of health services (i.e. self-care, preventive care, medical practice, and organized health services), an additional programming approach could be devoted to examining specific diseases. Emphasizing prevalent illnesses, such major disease programming could be of interest to a significant portion of the viewing population at any given point in time. The percentage of a population that has had some contact (directly, in anticipation, or by personal relation) with diabetes, cancer, alcoholism, heart disease, obesity, drug addiction or gastrointestinal disorders is likely to be at least five per cent, and in some cases as high as 30 or 40 per cent. Consequently, the appeal and importance of well-produced programming of this sort, reviewing a disease from causes and symptoms to therapy and rehabilitation, should not be underestimated.

To repeat, these programming ideas are not intended to be exhaustive but rather, merely to suggest the different kinds of informational material that could be brought together by a community-oriented health education service on cable television. Moreover, the success of such a venture will be based as much on presentation as on substance. If a traditional format is adopted, programs would be developed as packaged, half- or one-hour segments for fixed time slots in a weekly schedule. On the other hand, numerous innovative approaches could be explored. One new format might

consist of a medically-trained "disc jockey," who, along with a small programming team, would coordinate the day's viewings (including information about local services, call-in questions and answers, film clips, discussions of health facts, news segments, etc.). This latter approach corresponds more closely to the notion of a televised <u>service</u> versus the conventional programming schedule, but, again, its viability is unproven and will have to be demonstrated.

In sum, the most that a paper such as this one can do is to indicate the theoretical viability of a televised health education service. Most of the facts at our disposal about cable television -- its channel copiousness, its low access costs, and its relative lack of dependence on mass audiences -- suggest that it is a natural medium for a service of this kind. But, at the same time, the medium per se will not educate the public unless accompanied by appropriate programming. This means attention to content relevance and digestibility, to program scheduling and promotion, and to feedback from both the viewing community and medical professionals. And it is also likely to mean some form of subsidization of programming facilities and production costs though, as was suggested above, these may be modest even compared to ETV budgets.

What continues to remain at issue, however, is where the health programming, which has been hypothetically projected in this section, will come from. Clearly, much of it could be produced locally at low budgets. It would be locally-oriented and locally-developed. But ideally, this local programming would be supplemented by higher-cost, and more centrally-produced programs, for example, on major diseases and the universal aspects of

preventive health. And yet, in the course of completing this study very little programming of this sort was uncovered. This strongly suggests that both government and the medical profession will have to re-orient their current programming efforts in the health field in the future, if the clear-cut potential of cable television in public health education is to be realized. The present focus of these efforts is almost exclusively on professional needs; it will have to be broadened to include those of the public as well.

If, in conjunction with cable television's development, such a re-orientation does take place, we are likely to witness the emergence of a multi-tiered system of public health programming production. At the local level, a public health channel or programming center would collect information on local health services and events, and provide the community with a variety of relatively unrehearsed programming. This programming center could be staffed within a community health center or could utilize the joint resources of several health organizations. Its activities would, however, be supplemented in a number of ways. They would be supplemented at the national level by programming sources such as those which already exist in the continuing medical education area -- e.g. the Medical Medica Network (California), the Network for Continuing Medical Education (New York), or the National Medical Audiovisual Center (Atlanta). These national sources would produce public health programming that is of "universal" relevance, thereby freeing the local centers to concentrate on community-related health information. Programming sources at other, intermediate levels are also likely to become involved, particularly once the viability of cablecasting health

information is demonstrated. In a large metropolitan area, for example, a dozen or more medical institutions and groups (e.g. hospitals, public health departments, medical centers, community health programs, county medical societies, etc.) could each develop occasional programming in their own areas of expertise -- from medical organization to family planning. And, if properly coordinated, this projected mix of local, regional, and national programming sources could lead to a balanced and resource-efficient system of public health education.

It is further possible that a number of health-related organizations will want to utilize the cable system for more directed purposes in health education. For example, the practice of Mexico's Social Security Administration and of several domestic hospitals (e.g. Camarillo State Hospital in California, Salem Hospital in Massachusetts) to present televised instructional programs to their patients may be adopted by other hospitals in the future. Both health and occupational programming could be developed specifically for this purpose, not only for bedridden patients but for outpatients as well (as is currently being planned by Grady Memorial Hospital, Atlanta, in the area of family planning). And beyond pure hospital usage, prisons, nursing homes and mental health institutions may also wish to integrate televised instruction with ongoing rehabilitative programs.[22]

In the long term, as the technology of cable television matures, even more sophisticated applications of public health education could be attempted

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22. A number of studies of the utilization of television in group psychotherapy have already been recorded, with generally positive results. See, for example, Frederick H. Stoller, "Group Psychotherapy on Television," in Milton M. Berger, ed., Videotape Techniques in Psychiatric Training and Treatment (New York: Brunner/Mazel, 1970); or H. Tucker et al., "Television Therapy: Effectiveness of Closed-Circuit Television as a Medium in Treatment of the Mentally Ill," A.M.A. Arch. Ophthal. Otolaryng., 77: 57-59, January 1957. For an overall discussion of psychiatric uses of television, see James J. Onder, The Manual of Psychiatric Television: Theory, Practice, Imagination (Ann Arbor: Maynard House, 1970).

With the proper switching equipment, different programs could be sent to viewers, grouped by needs or geography, over the same channel. And as two-way (signal-return) communication becomes possible, viewers will be able to send information related to their health needs directly to the programming source as well as to participate in certain forms of "programmed instruction." This same kind of system might also be used to transmit facsimiles of printed health information to the home and, ultimately, to schedule hospital visits or medical referrals on an individual basis.

These last few items represent the long-range potential of cable television (which by then will have become a misnomer) as applied to public health education. Their specific programming applications and related costs remain largely unexplored. In the meantime, a substantially increased flow of health education programming into the home through cable television is now in the realm of possibility. If this possibility is fully realized, we could begin to transform our present notions of what it means to be a healthy society.

IV. APPLICATIONS IN HEALTH SERVICES DELIVERY AND ADMINISTRATION

The preceding two sections of this paper have focused on ways in which cable television could contribute to the improvement of health services, chiefly in terms of the current technology. As a result, the uses which were delineated have been primarily educational ones, relying on the medium's present home programming orientation. There is, however, an alternative approach to examining cable television's health-related promise. This second approach assumes that cable technology will become much more sophisticated; that current experiments in interactive forms of cable television and cable data transmission will eventually permit the development of a communications utility; and that such a utility will not only serve the programming needs of home audiences, but also the varied communication needs of our encumbered urban service institutions.

The role that such a communications utility could play in the area of health services is twofold. At the most general level, it could help resolve the principal structural dilemma that our health-care system currently faces; that is, how to decentralize its facilities and resources without forfeiting the economies of centralized organization. And in specific terms, a communicative utility could improve the system's capacity in a range of communications oprations, which directly affect the delivery and administration of health services. Since the structural dilemma underlies these specific uses, let us first examine its relationship to communications technology.

The concept of decentralizing health services no longer needs much elaboration. Its validity has been recognized by numerous health study groups and, increasingly, by the medical profession. In essence, what the concept proposes is a community-based mode of health-care delivery as an answer to

many of the problems inherent in today's centralized, hospital-based medical system -- problems of accessibility, of queuing (waiting and referral), and of assembly-line depersonalization. Indeed, the first signs of a decentralized health service have already started to emerge. As Gerald Rosenthal has reported, "new organizational and institutional forms, such as neighborhood health centers, satellite outpatient departments, and the like, are being developed."[23] These community-based institutions represent a clear alternative to the stigmatizing environments of hospital clinics and emergency rooms, which remain the principal health-care outlets for many of our citizens, particularly the urban poor.

At the same time, decentralization is not necessarily a cure-all; it embodies its own set of problems. Most of these stem from the economies of scale that can be achieved in the provision of health services and that are absent under decentralization. Particularly with respect to inpatient treatment, it is simply more efficient to provide related primary and ancillary services on a centralized basis. In other words, the on-line organization of specialists, nurses and technicians; equipment procurement and maintenance; effective dietary and life-systems support; accounting; and other functions can be performed more economically at a small number of teaching hospitals than at a host of community clinics.

And decentralization causes several other dislocations in the overall health delivery process. For instance, doctors become more isolated from peer-interaction; and it is, consequently, more difficult for them to stay abreast of improved medical practices. Moreover, specialized equipment and personnel must now be allocated throughout the medical system, which, in turn, creates new problems of accessibility and service definition. And the administration and coordination of a dispersed service system becomes an organizational challenge of often insurmountable proportions. There are, in

23. Gerald Rosenthal, "Health Care," in Samuel H. Beer and Richard E. Barringer, eds., The State and the Poor (Cambridge, Mass.: Winthrop Publishers, 1970), p. 210.

short, strong justifications for continuing many of our medical services on a centralized basis. And yet, decentralization is equally necessary if existing problems of service quality and coverage are to be overcome.

This structural dichotomy is not wholly unsoluble, however. Furthermore, it is the contention of this paper that new communications technology--and conceivably cable technology in particular--can play a very significant role in resolving it. For it is important to remember that communications systems (in contrast, for example, to stationary information banks) do not per se centralize or decentralize operations,but only link them. With the advent of a communications utility, the centralized resources of a health-care system could readily complement its decentralized services, and vice versa. And different aspects of medical service could be organized at different scales of population coverage in a mutually reinforcing manner.

What specific functions could such a communications utility support? The answer is many different ones. Some of these will be more administrative than medical in nature, though still specific to the delivery of health services. Some will require video or hard-copy equipment, others only digital transmission systems. Still others are difficult to classify, both in terms of content and required communications capability.

To begin with the last type, those difficult to classify, a prime example is the development of a unified patient record system. The recording and storage of individual health records is partly an administrative operation and at the same time central to the actual treatment of the patient. In addition, it remains unclear whether this function could be improved in the future through computer-based information systems or through video communication.[24]

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24. The tendency is to visualize a computer-based, digital communication system for the performance of this function. But there are counter-vailing arguments, based on limited institutional resources and user flexibility, which suggest that the video transmission of existing, handwritten or typed patient records may be the more effective solution, all factors considered, to the storage and retrieval problem.

What is clear, however, is both the ubiquitous and problematic role that patient records play in the organized delivery of health services. In the words of a recent study of communications needs in a major municipal health department:

> The problem of the rapid availability of patient records throughout a health care system is an enormous one. This is particularly true as basic outpatient services become increasingly decentralized. Under these conditions a given patient is very likely to utilize a number of health-care facilities over time, either because of change of residence or because of the varied distribution of specialized medical services. Providing doctors at different facilities with the patient's up-to-date medical record is an arduous health management task.[25]

What the report subsequently calls for, on the basis of interviews with the senior personnel of this department, is the development of an instantaneous and unified patient record system, with input and output terminals in the numerous physically-scattered facilities of the department. This is only one of the critical functions that an advanced communications system could perform in an urban area.

Once a system which interconnects decentralized health facilities is installed, its data-carrying capacity could be adapted to numerous other health-related needs. Management information systems for the scheduling of facilities and appointments could be readily maintained as could automated systems for service billing and insurance charges. So could special data banks for research into the spread of diseases. And the video or facsimile capacity of the system could be utilized for administrative communications, in both crisis and routine situations. In addition, since significant progress has already occurred in the computerization of

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25. Philadelphia City Planning Commission, "Telecommunications Needs for Municipal Functions in Philadelphia, Part II: The Department of Public Health," Staff Report, November 1970, p. 5. This planning report was drafted by the author of the present paper, while employed by the PCPC during the summer of 1970.

various medical functions (e.g. in interactive diagnosis, electrocardiogram and electroencephalogram analysis, life system monitoring, etc.), an appropriate communications system could ultimately make these operations available to the community health center as well as to the large hospital or medical school.[26]

Other uses to which such a system could be applied relate very directly to the actual delivery of health services on a decentralized basis. The complementary notions of telediagnosis and teleconsultation, whereby physicians assist in the prescription of patient therapy by remote video access to local health outlets, suggest not only what is possible, but what may be pragmatically necessary in the transition from a system of health-care that is predominantly centralized to one that is community-based. For example, in a detailed analysis of the current hospital system of one metropolitan area (Cincinnati), Jerry Schneider concludes: "it is clear that the present spatial gap between the supply of and demand for hospital services...is very great." But he adds that, "If a dispersal of hospital facilities were begun now in Cincinnati, we estimate that some 20 to 30 years would probably be required to achieve a hospital system that is patient-oriented..."[27] However, an operational dispersal of services, if not of actual facilities, could be accomplished much more rapidly through the appropriate design of telediagnosis and teleconsultation systems.

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26. On medical computerization, see Charles A. Myers, Computers in Knowledge-Based Fields (Cambridge, Mass.: The MIT Press, 1970), pp. 75-98.

27. Jerry B. Schneider, "The Spatial Structure of the Medical Care Process," Regional Science Research Institute, Discussion Paper Series No. 14, Philadelphia, July 1967, pp. 49 and 52-53.

A case in point is a new health program recently proposed by New York City's Health Services Administration.[28] The idea behind the proposal is to interconnect a series of neighborhood pediatric centers to a nearby municipal hospital with the help of two-way closed-circuit television. It is envisaged, for example, that under the new plan these centers, or child health stations as they are presently called, could be open 16 hours a day instead of the current two-and-a-half. Seven times as many patients could be served through telediagnosis and teleconsultation. And either by remote video or with added hard-copy equipment, patient records and other medical data could be transferred to a central storage facility, facilitating continuity in follow-up services. In addition, because of the greater volume of service that is projected, this system would, according to the proposal, reduce unit service costs by ten to 30 per cent over the current procedure.

Similar, two-way video systems are already being proposed for the delivery of psychiatric services to prisons in New York City. But more importantly, for the purposes of this paper, such systems have already been tested through a series of demonstration programs. In fact, the utilization of two-way television in medicine dates back to at least 1964. It was at that time that the Nebraska Psychiatric Institute in Omaha and Norfolk State Mental Hospital, 112 miles away, were linked together for a variety of medical communications services, including staff education, psychiatric consultation and diagnosis, televised patient visits, remote ward administration and personnel training, and joint research.[29]

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28. A. L. Levin, M.D., and David Othmer, "A Proposal for Conversion of New York City Child Health Stations to Pediatric Treatment Centers Using Closed-Circuit Television," Health Services Administration, New York City, 1971.

29. Rebe A. Benschoter, "Multi-Purpose Television," Annals of the New York Academy of Sciences, Vol. 142, March 31, 1967, pp. 471-78.

Other medical centers have also developed two-way transmission facilities for the remote delivery of health services and/or medical education and research purposes. These include the University of Kansas Medical Center, Hitchcock Medical Center at Dartmouth College, the Louisiana Hospital Television Network, and the Medical Center Hospital of Vermont. The Vermont network, for example, which links two hospitals about a half mile apart, was initially utilized for fluoroscopic examinations and in radiation therapy but has gradually expanded its range of functions. It is now used to monitor electrocardiograms, microscopic images, and electroencephalograms, as well as surgical procedures and teaching conferences. And in the future, the system hopes to serve two community hospitals, each about 40 miles away, with supportive diagnostic and consultative resources.[30]

Finally, the most publicized of the experiments in "telemedicine" have occurred at Massachusetts General Hospital in Boston. There, under the directorship of Dr. Kenneth Bird, two principal links have been established. The first of these tied a remote medical station at Logan Airport to MGH's emergency room. With the assistance of a nurse/camerawoman at the airport facility and of supplementary electronic instruments, MGH physicians have providing counselling and treatment to more than 2,000 patients through this system. Another link, between MGH and the Veterans' Administration Hospital in Bedford, Massachusetts, some 25 miles away, has been utilized for remote psychiatric services and for professional consultations.

For the most part, these demonstration projects have been successful in what they set out to prove, namely, that problems of accessibility to medical services due to the uneven distribution of medical resources could be alleviated through the utilization of two-way television. As Dr. Raymond Murphy et. al. concluded in a preliminary evaluation of the MGH/Logan Airport system, telediagnosis "can help bring the special knowledge and skills of the teaching

30. John P. Tampas, M.D., and A. Bradley Soule, M.D., "Experiments with Two-Way Television in a Teaching Hospital Complex," The Journal of the American Medical Association, Vol. 204, June 24, 1968, pp. 1173-75.

hospital and medical center to remote as well as less remote medically disadvantaged areas."[31] More specifically, Dr. Cecil Wittson in assessing the earlier Nebraska system points to two services, neurological evaluations and speech therapy, which due to staff limitations were simply not available to patients at Norfolk State Mental Hospital prior to its linkage with the Nebraska Psychiatric Institute. "It is in these situations," he concludes, "where previously unavailable services can now be provided by combining the capabilities of two or more institutions, that television presents particular promise to the medical profession."[32] And he suggests that the two-way video linkage improved both the morale and overall capabilities of the Norfolk personnel as well as permitted them to keep up to date with professional developments in Omaha--a factor which should ultimately assist such outlying public institutions (whether in rural areas or in inner-city ghettoes) to recruit and maintain qualified staffs.

Needless to say, skeptics have continued to doubt the viability of providing health services through the TV medium. But in reponse to these doubts, the practitioners of telemedicine have pointed to the detailed results of their experiments. They have asserted, for example, that with the adequate training of assisting paramedical personnel and with appropriate ancillary equipment, "over 90 per cent of the medical problems which present themselves can be magaged by a telediagnosis system."[33] And with a few exceptions (e.g. gynecologic palpation), most diagnostic operations, experience has convinced them, can be practiced at a distance--including the perception of physical symptoms and cardiac sounds, and the analysis of blood and urine samples, X-rays, or electrocardiograms. Most importantly, patient reactions to the

31. Raymond L.H. Murphy Jr., M.D. et. al., TeleDiagnosis: A New Community Health Resource, Report I, Massachusetts General Hospital, 1970, p. 15.

32. Dr. Cecil L. Wittson, "Nebraska Initiates Cross-Country TV-Psychiatry," Educational Screen and Audiovisual Guide, November 1965, p. 23.

33. Raymond L.H. Murphy, Jr., M.D., et.al., op.cit., p. 13.

telediagnosis system have, they report, been overwhelmingly positive.[34]

The practitioners of telemedicine have also challenged a different breed of critics; those who feel that an audio medium is all that is needed for remote consultation and diagnosis. This may be true, they have said, but only for limited purposes. Electrocardiographic data or pulse rates can be transmitted over the telephone and symptoms can be verbally described. X-rays, on the other hand, are much more difficult to deal with and the remote analysis of blood or urine samples is not possible except with the aid of a telemicroscope. In addition, as Reba Benschoter, who heads the Biomedical Communications Service at the University of Nebraska Medical Center, points out, simultaneous two-way video communication creates a psychological presence between doctor and patient which the telephone, even with the help of a nurse at the patient terminal, can simply not duplicate.[35]

If we accept all of the above capabilities and experimental accomplishments, it is clear that telemedicine may play an important role in the health-care delivery system of tomorrow. The future development of telemedicine does, however, face one significant hurdle; that of costs. For example, the cost of leasing microwave relay lines for the NPI-Norfolk system involved on annual outlay of about $50,000. The microwave transmission network proposed by the Health Services Administration in New York City would cost $125,000 for a system covering four neighborhood child health stations. And the overall development of the MGH-Bedford system has been supported by a three-year grant of $340,000 from the Veterans Administration; also not a paltry sum. While demonstration systems justify these kinds of expenditures, it is unlikely that wide-scale adoption of telemedicine will proceed unless ways of cutting costs are found. Furthermore, since transmission lines, whether built or leased, constitute such a major expense, it is in this area that a breakthrough will have to be made.

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34. See ibid., pp. 9-14

35. Personal interview response, March 5, 1971.

It is these cost considerations that also raise the underlying question of whether cable television systems can provide the health-related communications functions outlined above. For unless a time-shared, multi-purpose communications utility based on cable technology is developed, there is no other easily discernible alternative to today's high-cost and fragmented approach to communications needs in health and other service areas.[36]

Unfortunately, no definitive answer to this underlying issue can be formulated as yet. Intensive research into the performance and cost parameters of cable technology will have to be carried out before it becomes evident if a communications utility for health and other uses is feasible. This research will also have to examine problems of institutionalization, user attitude, and professional ethics which may arise in conjunction with the remote delivery and administration of health services.

In the meantime, one can only point to a few promising signs here and there. One is the judgment expressed in the New York City proposal for television-supported child-health centers that, were cable installed in the appropriate service areas, this would represent the "least expensive transmission method."[37] Another is some recent system design work completed within the General Electric Company, which suggests that a two-way medical communications network can be compatible with cable television.[38] If this is the case, then we may be on the verge of

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36. It is conceivable that the Picturephone could constitute such an alternative. However, the ultimate cost of the Picturephone, as well as its capability to transmit alphanumeric data, remain uncertain. Its resolution is inadequate for telediagnosis. And while a sophisticated, multi-purpose cable television system could transmit many-to-one educational or training programs along with limited point-to-point services, it is unclear whether the Picturephone could also serve this package of diverse functions.

37. A. L. Levin, M.D., and David Othmer, op.cit., p. 11.

38. Preliminary information from Dr. Edwin Langberg, Medical Systems Consultant, General Electric Company.

a health-care delivery system that can better cope with the numerous service accessibility and coordination issues which confront it today.

V. CONCLUSION: ISSUES IN THE IMPLEMENTATION OF TELEMEDICINE

What are some of the general conclusions that can be drawn from this preliminary review of cable television's potential to improve the delivery of health services? They are, it seems, as follows. In a very positive sense, we have found that the overall promise of the technology is substantial. The multiple-channel capacity of cable television can provide a new, video-programming distribution mode into the home, the doctor's office and the hospital ward, the effects of which, though not easily measurable, could have a considerable impact on the health-care delivery process. The public would become more informed about health services and more knowledgeable about preventive health practices. And, through continuing education and training programs, the effectiveness of our medical manpower would be increased. In addition, it has been suggested that the limited accessibility and often depersonalized nature of existing medical care could be reduced through the development of cable-based telemedicine systems, which would extend health services out of today's congested hospitals and into the community.

These are important findings. They highlight the fact that cable technology can be brought to bear on some of the critical problems that face today's medical system. But, at the same time, a simple affirmation of these positive findings leaves much unstated.

It assumes, first of all, that appropriate health programming will be forthcoming as soon as the new distribution system is in place. This is a significant assumption, particularly in the public health education area, where both public health agencies and the medical profession remain, on the whole, wedded to traditional and inadequate approaches, and unmotivated about forging new ones.

Another important area where communications technology can contribute to our health needs is in continuing health education, for both professionals and the clients of the medical system. Television's role here is likely to be particularly vital, since much of medical information has a visual dimension. Techniques of self-treatment, of diagnosis, or of psychiatric interviewing cannot be easily transmitted by print. In addition, television can overcome problems of literacy. These, paradoxically, beset not only the educationally disadvantaged but, in a different way, also the physician, who must wade through dozens of research periodicals to keep up to date with changing medical practices; practices which could often be better demonstrated on short film clips. Finally, new communications technology could be instrumental in relieving many of the delays in medical testing and referral that cripple today's health delivery process. It is this cumulation of minor annoyances (e.g. a two-hour wait for service, a faulty referral, a lost health record) or, on the other hand, physical inaccessibility to health services, that is at the heart of the medical system's inability to cope with our currently recognized health needs. Automated screening programs and teleconsultation systems are nascent steps toward the alleviation of some of these problems, but their utilization is not as yet widespread. Nor has the range of communications technology that could be applied to overcoming problems of access, referral, and routine checkups been fully explored.

Hopefully, the foregoing comments have served to sketch the case that communications technology can be a valuable ingredient of an improved health-care delivery process. The following sections of this paper will focus on the specific potential that cable television brings to this proces. However, in reading these subsequent sections, two organizational concepts should be kept in mind. The first of these is that communications technology, including cable television, is most likely to be integrated into our medical system in a piecemeal and disjointed fashion. This has been the pattern of medical

utilization of technology in the past, and, unless expressly modified, will probably continue to be in the future. The other concept is that of comprehensive health communications planning. It is a concept with little tangible identity, one which hospitals and medical agencies are only beginning to consider. But particularly when taken in conjunction with emerging concepts of how our health-care system should be restructured, it merits closer examination.

There are, to be sure, some distinct advantages to an incremental pattern of technological adoption. Discrete functional needs, for instance, are ideally satisfied by a variety--from a technical standpoint--of communications systems. "In analysing information processing needs," the Harvard-MIT Task Group has stated, "the most productive tactic appears to be the development of modules for specific information processing activities, allowing precise identification of objectives and requirements."[5] In optimal (technical) terms, the same point could apply to a communications technology like television, where separate systems would be designed for separate functions (e.g. x-ray transmission, data display, and telediagnosis. Moreover, the incremental approach is much more adaptive to conventional budgetary schedules as well as to user acceptance of new technology. How does an administrator fund a master overhaul of communications activities, and how does he convince his employees that it is necessary?

But there are also significant disadvantages to the incremental approach. In many instances, different uses of a given technology can coexist on the same system, leading to long-term cost savings and to the development of still more flexible, multi-purpose systems. In relation to cable technology specifically, a piecemeal strategy could fail to capitalize on the technology's full potential. For example, only those uses of the medium which are immediately discernable and easiest to implement (e.g. one-way and home-oriented uses) might be tested, leaving the technology's "hidden" capacities by the wayside.

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5. Rutstein and Bien, op.cit., p. 140.

Again, these are straightforward concerns. The more of the above franchising issues that are resolved postively, the greater the liklihood that some of the potential health programming uses of cable television will be achieved. These uses, in other words, will follow incrementally.

By contrast, the situation is altogether more complex when one approaches the question of how to implement the service-oriented, potential uses of cable television. While the concept of a multi-purpose health communications utility of the kind described in section IV is extremely promising, it remains subject to numerous uncertainties. And these uncertainties are not likely to be reduced unless large-scale, publicly-supported analysis, experimentation, and planning is undertaken. Such a comprehensive process of evaluation would have to examine in depth the institutional, economic, technological, and regulatory dimensions of implementing telemedicine systems based on cable technology. What follows is a summary of the issues which each of these dimensions incorporates, and how some of them could be more fully explored.

First, <u>institutional</u> factors, though often the most difficult to asses, are basic to an understanding of telemedicine's value to the performance of health-related functions. It is in this context that we must ask if the introduction of communications technology will really improve health-care delivery and facilitate the achievement of health goals (e.g. accessibility) or whether it will only serve, as radical critics contend, as a subterfuge for increased medical expenditures and professional aggrandizement. In addition, we must determine if the members of the medical institution, professionals and administrators as well as users, will respond positively to the introduction of such technology. In practice, this will mean resolving several questions. For example, are health organizations capable--in terms of manpower, information programs and supporting facilities--of putting the technology of telemedicine

to its optimal use, or will special training and other programs have to be developed? And correspondingly, how can the attitudes of users, concerning the delivery of health care, be introduced into the design of new, technology-based health delivery systems?

A second important aspect of the acceptability of cable systems to the health services administrator will, of course, pertain to the cost implications of such systems. This is why economic analysis must accompany the overall evaluation of cable systems for telemedicine. First, some clear-cut assessment must be made of the respective costs and benefits of both simple and more complex models of health communications utilities.[40] In addition, determining how much of these costs will have to be borne by local health institutions or other public funding sources (as opposed to those which will be covered in commercial development) is a critical task. The economic hypothesis that sophisticated health applications of cable television can be appended to commercial cable systems at only incremental costs to the public sector verges on the outcome of this determination. Finally, the extent of these added costs and who specifically (municipalities, the profession, federal government) will undertake them also remains at issue. Perhaps existing programs in health facilities construction and educational media development will finance some of the increment, but additional government grants or new legislation may also be required.[41]

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40. A useful model of media cost analysis, including production, distribution and reception costs, is provided by Michael G. Sovereign, "Costs of Educational Media Systems," Series II paper, ERIC Clearinghouse on Educational Media and Technology, Stanford University, June 1969.

41. For example in "Telemedicine: A New Health Information Exchange System," a paper delivered at the 1970 Medical Services Conference of the American Medical Association, Dr. Kenneth T. Bird and Marie E. Kerrigan, R.N., both of the Massachusetts General Hospital, have urged that, "A separate entity probably within the Department of Health, Education and Welfare be created and given the authority and funds to facilitate the emergence of telemedicine...[and that] a massive government-initiated engineering program to transfer space-age instrumentation and capabilities into telemedicine be started now."

In order to adequately resolve many of the institutional and economic questions related to the application of cable technology to health services, a closer examination of the technology itself is also necessary. Ideally, such an evaluation would be conducted through a series of demonstration projects testing a variety of public and social service uses of cable TV. The health component of such a project, or projects, might consist of a two-way telecommunications network, linking a city's or urban area's various health institutions (i.e. public health agencies, major hospitals and medical schools, community health centers, etc.) for telediagnosis, teleconsultation, and the electronic communication of patient records and other health data. The demonstration project would evaluate the benefits and costs of these "remote" health services and would suggest the kinds of technical equipment and requirements (e.g.channel and two-way capacity, receiver terminals, computer systems, etc.) that would support an area-wide, multi-purpose health communications utility. In addition, the project would assess the overall compatibility of the demonstration network with conventional "tree-type" cable systems; with other types of cable systems (e.g. Rediffusion or loop-distribution); as well as with other media, such as the telephone, ITFS, Picturephone, and cassettes.

It is the cumulative results of the above kinds of research and demonstration efforts that will permit us, much more conclusively than at present, to judge whether telemedicine presents a desirable and feasible solution to many of our current health delivery problems. These results will also tell us whether a comprehensive system of telemedicine can be superimposed, technically and economically, on commercial, home-oriented cable television systems. And if the latter is the case, the results will also indicate the types of regulatory considerations technical and otherwise, which should govern the long-term development of cable technology. For all of these reasons, the value of a large-scale demonstration project is particularly relevant.

In the meantime, both franchising authorities and health institutions would be well advised to cooperatively explore and plan health service utilizations of cable technology. Otherwise the regulatory challenge of cable television will not be met in the best public interest. For while cable television's potential in the health services area is enormous, this potential can be easily channeled away from the pressing inadequacies of today's health-care system. Commercial programmers may produce health programming for cable television, but only for financially-viable audiences (e.g. physicians and not nurses). Health professionals may also utilize cable TV, but primarily to promote professional activities (e.g. research or public relations) and at the expense of needed public health education. And city governments may benefit from cable television by taxing its revenues rather than insuring that socially-valuable, cable-based services in health and other areas are generated.

To encourage genuinely public service uses of cable television, regulatory control is not likely to, nor should, shape the medium's content, but it can facilitate the realization of overall public and social objectives. For these objectives to become manifest in the health area, and for them to be translated into clear regulatory postures, the combined voices and evaluations of health professionals, consumers, administrators, and public leaders will have to be heard. Otherwise, we are likely to develop a system of telemedicine that serves the interest of only a few; or no system at all.

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"Oh my," Mrs.Thompson said. "How far away is he?"
"Two and a half miles," Dr. Murphy said, not looking up from the cardiogram.

(Michael Crichton in Five Patients, describing Massachusetts General Hospital's telediagnosis system.)

At the age of 30 Rosa Lee Welch had gone North, having never once laid eyes on a doctor, and at the age of 31 had still not had the medical work-up she so obviously needed -- mind you, after a year in Boston's Roxbury, after a year of living within a few miles of some three medical schools and some hospitals that are the world's finest.

(Robert Coles, "The Doctor and Newcomers to the Ghetto," The American Scholar, Winter, 1971)

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